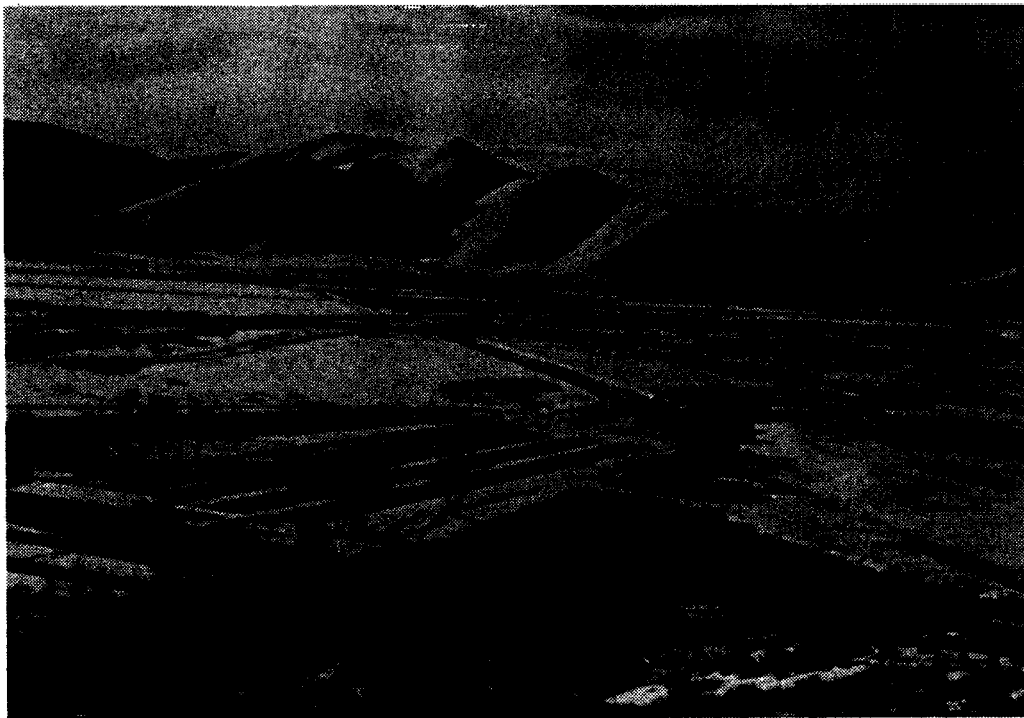




HAYSPUR HATCHERY ANNUAL REPORT

October 1, 1985 to September 30, 1986



by
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April 1988

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ABSTRACT

Hayspur Hatchery is both a production and broodstock station for Hayspur strain (R9) rainbow trout. In 1985, 646 female trout were spawned, yielding 1,780,470 green eggs that had an 83.012 eye-up. Transfers of rainbow trout to Mullan Hatchery totaled 45,423 (12,600 lb.) catchable size fish in 1986. During 1986, hatchery personnel reared and stocked 792,365 fingerlings and 211,500 catchable size R9 trout. There were 40,176 catchable size Mt. Lassen strain (R4) trout received from the American Falls Hatchery and redistributed. Eighty-two excess broodstock were released in Rock Creek (Twin Falls County) during 1986.

Fish feed utilized in production totaled 163,750 lbs. at a cost of \$27,403.44. Broodstock were fed 8,250 lbs. at a cost of \$1,721.32. Total feed cost at the Hayspur Hatchery was \$29,123.76.

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INTRODUCTION

Hayspur Fish Hatchery is a rainbow trout production and broodstock station located on Loving Creek, a tributary to Silver Creek of the Malad River drainage. Approximately 18 miles southeast of Hailey, Idaho, the hatchery is a point of interest for visitors in the Sun Valley area (Fig. 1). Originally established in 1906, Hayspur is the oldest trout hatchery now within the Idaho Department of Fish and Game (IDFG). The facility's popularity with visitors is enhanced by close proximity to the Nature Conservancy's Silver Creek Preserve, a broodstock pond holding some 6,000 adult rainbow trout, and a public campground.

Water available to the hatchery is from four sources. Approximately 18 cfs of variable temperature water is diverted from Loving Creek and may be channeled to the large raceways, broodstock pond, small raceways 7 and 8, or Gaver Lagoon (Figs. 1 and 2). A developed spring provides 5 cfs of 53°F water, which may be distributed through piping to incubators, vats, small raceways, and large raceways. Two artesian wells provide 2.5 cfs of 53°F water to the large raceways. Several undeveloped springs provide approximately 2.0 cfs of 53°F cool water to the broodstock pond. With the exception of N₂ supersaturation, the spring and artesian well water are excellent for rearing rainbow trout. Loving Creek water is of marginal quality for rearing of trout. Stream water temperature is extremely low in the winter and exceeds 70°F during the summer peaks (Fig. 2). Turbidity as well as excessive organic material loads reduces water quality from September through May.

Permanent staffing consists of a Fish Hatchery Superintendent II, a Fish Hatchery Superintendent I and a Fish Culturist. A laborer and two Summer Youth Employment Training Program workers are employed during the summer, while a Bio-Aide augments the staff during the fall and winter spawning season.

Structures on the grounds include: three residences, a four-stall garage-shop-office-temporary quarters building, a hatchery-nursery building, a three-stall wooden garage and a large barn. In addition to the hatchery itself, the Hayspur complex includes a 30-acre campground-park and some 70 acres of undeveloped wildlife habitat.

The fish rearing facilities include: seventeen 8-tray stacks of Heath incubators capable of eyeing 4.9 million eggs or hatching 1.5 million eggs; 20 concrete vats (2.5 ft. x 13 ft.) with a rearing capacity of 1.2 million fry up to 300/lb.; eight small concrete raceways (7 ft. x 100 ft.) which hold up to 780,000 fingerlings at 65/lb.; six large concrete raceways (12 ft. x 400 ft.) with a capacity of up to 300,000 catchable size trout if water conditions are optimum;

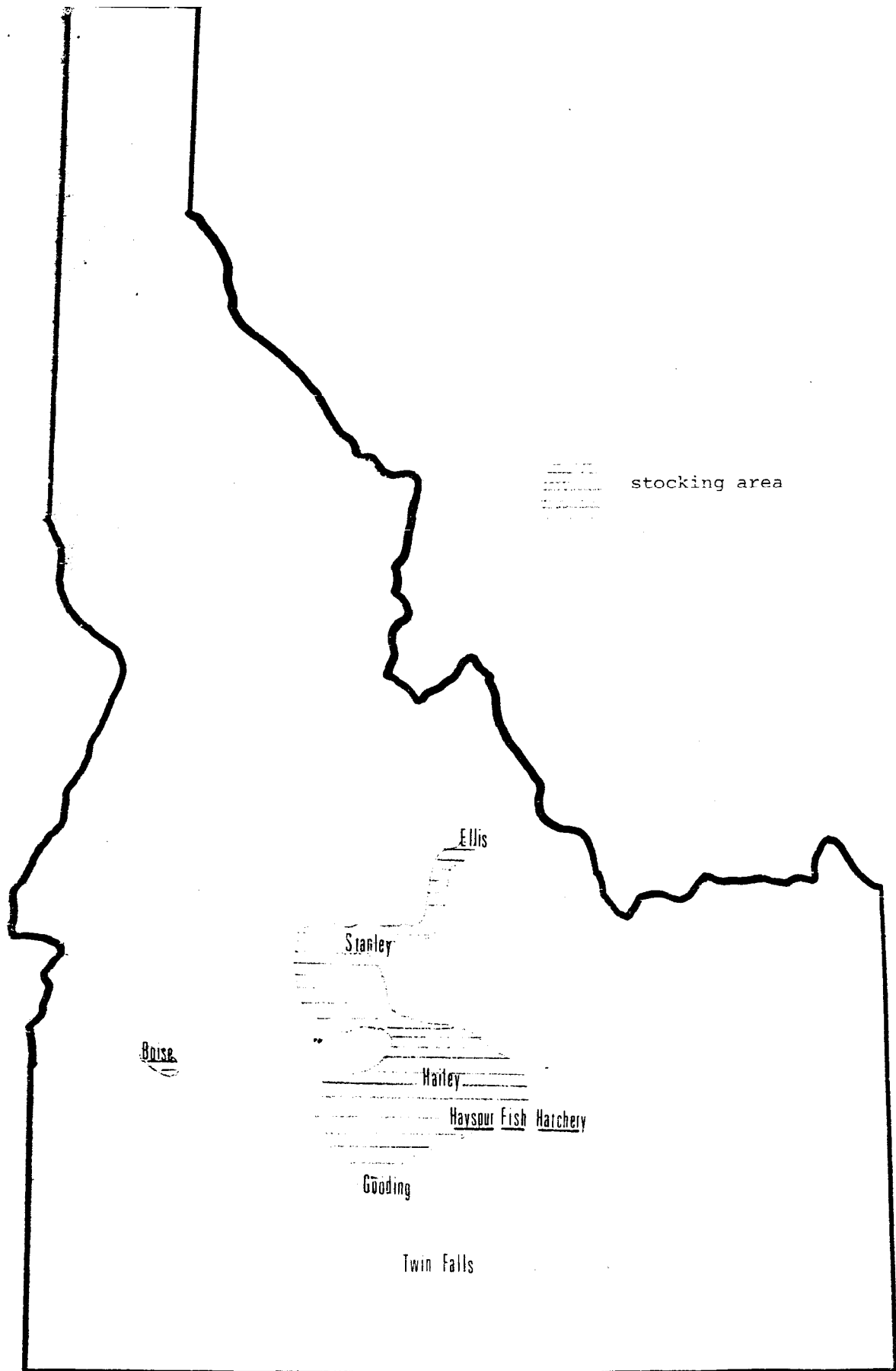


Figure 1. Trout stocking area covered by the Hayspur Fish Hatchery.

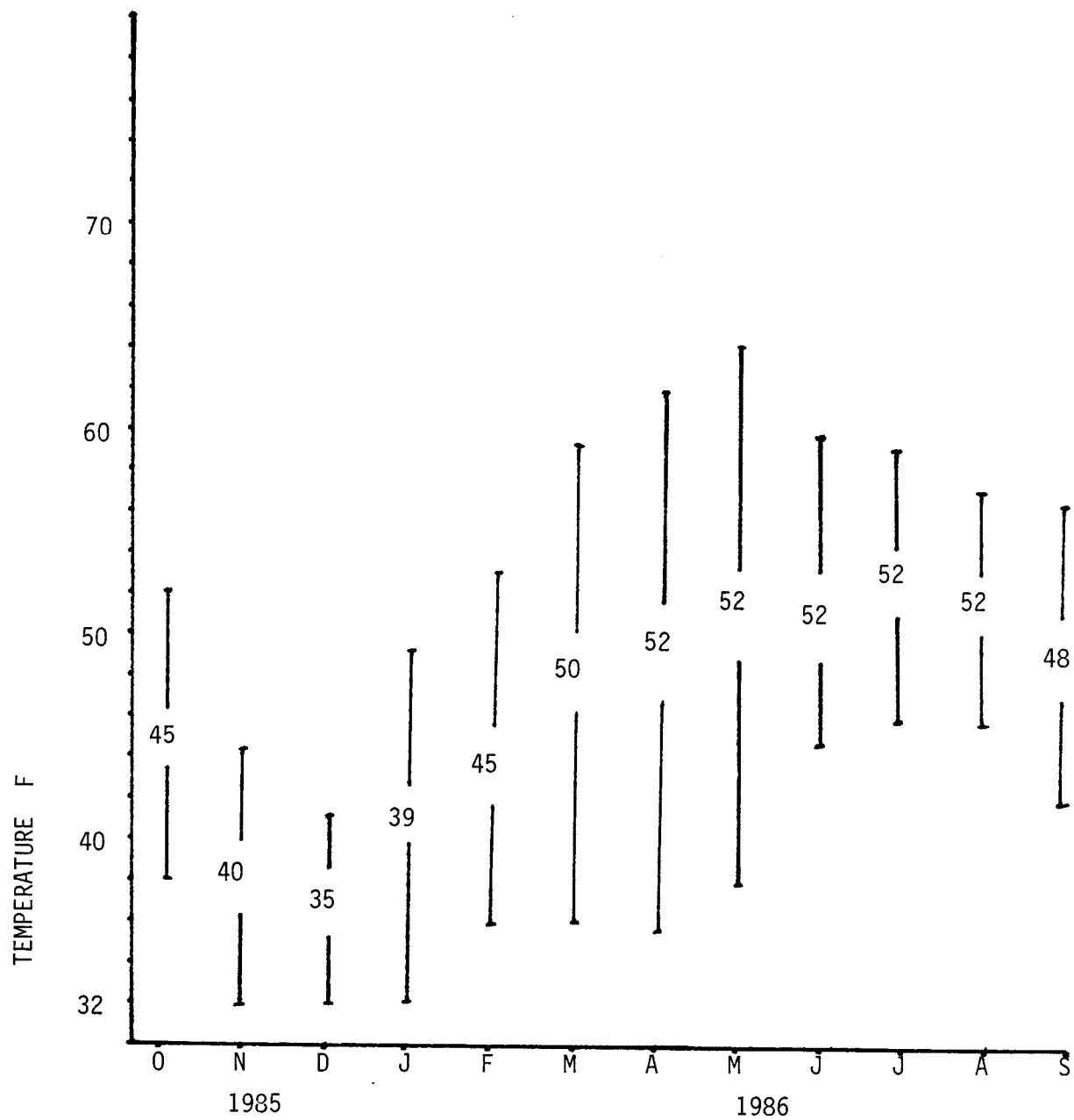


Figure 2. Monthly temperature ranges and average daily temperature in Loving Creek water at the Hayspur Fish Hatchery.

a large dirt pond (500 ft. x 500 ft.) holding up to 50,000 catchable size trout and a broodstock pond (150 ft. x 400 ft.) capable of holding in excess of 6,000 adult rainbow trout. Cleaning waste from the vats and small raceways is flushed into the broodstock pond, while the cleaning waste from the large raceways flows into the drainage ditch prior to returning to the Loving Creek channel (Fig. 3).

During recent years, trout production has been near 100,000 lbs. with 300,000 catchable size fish and 500,000 to 1,000,000 fingerling trout stocked or transferred. The Hayspur strain broodstock have produced 3 to 5 million eyed eggs for local use and transfer to other stations.

Fingerling production is limited by the availability of spring water and an effective delivery system. Additional water sources must be developed and the piping system improved to exceed present production. Catchable trout rearing is limited by extremely low water temperatures from November to March when growth virtually stops. Water temperatures in Loving Creek from April to August often exceed 70°F and must be tempered with cooler spring water to prevent mortality. The broodstock program could be much improved by construction of concrete holding ponds and the collection of the spring water that now seeps into the pond.

OBJECTIVES

1. To raise 110,000 lbs. of catchable size rainbow trout for stocking in waters of Region 4, Region 6 and transfer to other state hatcheries.
2. To distribute approximately 250,000 catchable size rainbow trout and 800,000 fingerling rainbow trout.
3. To rear rainbow trout broodstock and take 3.0 to 5.0 million eggs for rearing at the Hayspur Hatchery and transfer to other state hatcheries.

GENERAL FISH CULTURE

Loading

Heath incubators are loaded with approximately 160 oz. of green eggs per tray. Green eggs are enumerated using the Von Bayer method (Leitritz and Lewis 1976). Water temperature is a constant 53°F and

flow varies from 4 to 5 gpm per stack. After the eggs accumulate 300 Temperature Units (TU), they are shocked by pouring between a tray and a bucket and allowed to set 24 hours prior to the removal of dead eggs. Dead eggs are removed with a mechanical egg sorter and by hand picking. Both eyed eggs and dead eggs are enumerated using the Burrows Displacement method to obtain an accurate estimate of eyed eggs as well as determine eye-up percentages (Burrows 1951). Eyed eggs are then loaded at 38 oz. (Burrows Displacement) per tray for hatching. Trays are examined and hand picked to remove any dead eggs found between eye-up and ponding.

Fry are transferred to vats at 60,000 fish per vat 49 days (1,029 TU) after fertilization. This number of fish can be successfully reared to 250/lb. for transfer to outside raceways without splitting prior to movement. A Density Index (DI) of 2.0 and Flow Index (FI) of 4.0 as described by Piper et al. (1982) are upper limits of fish density, where feed conversion and growth rate drop while mortality becomes elevated.

Fish are reared in the small raceways until stocking as fingerlings or transferred to the large raceways for rearing to catchable size. The DI does not exceed 0.5 in the small raceways, but due to a maximum flow of 0.33 cfs per raceway, the FI can reach 4.0 in meeting production goals.

The large raceways are loaded for holdover fish between June and September. The numbers of fish are set low so that 12,000 lbs. per raceway is not exceeded. Water temperatures in excess of 65°F from April through August require close monitoring of conditions in these raceways and reduced loading.

Hygiene

All egg handling equipment is disinfected in a 1:100 solution of Argentyne. In addition, all eggs are water hardened in a 1:100 solution of Argentyne for one hour prior to placing in trays for incubation. To prevent fungus development in green and eyed eggs, a 15-minute flush of formalin at 1:600 concentration is administered daily, Monday through Friday. Formalin treatments are stopped 25 days after fertilization to prevent treating early hatching fry.

Hatchery vats and small raceways are cleaned daily. Fish handling equipment and vats are disinfected with a 1:100 solution of Argentyne and the small raceways are disinfected by spraying with chlorine. Extreme care is necessary when using chemicals in vats or small raceways because they all drain directly into the broodstock pond.

Large raceways are swept on Mondays, Wednesdays and Fridays. Fish handling equipment is disinfected with a 1:100 solution of Argentynine after use if it is to be used in another raceway.

All mortalities and dead eggs are disposed of in a covered pit to reduce possible disease transfer (to either hatchery fish or wild trout) to adjacent waters.

Weighing and Enumerating

All lots are sample weighed on the 15th and last day of each month to evaluate growth. Feed levels, conversion rates, growth rates and pond loading levels are monitored and/or adjusted from these samples.

Total lengths are periodically taken to verify actual condition factor $(C) = \text{weight}/\text{length}^3$. Measurements indicate that Hayspur fish have a length-weight relationship very close to $C = .0004$ throughout the year. The length-weight tables for $C = .0004$ found in Piper et al. (1982) are used to determine length increase when pound counts are taken.

Total weight and enumeration of lots are accomplished when fish or eggs are transferred between containers. Eggs transferred to vats and fish moved from vats to small raceways are weighed using a hanging spring scale. Fish transferred from small raceways to large raceways and fish loaded for stocking are weighed by water displacement in a planting tank. Both planting tanks were recalibrated to be consistent with the spring scale (Thorpe 1985).

Feeding

Feed levels are calculated using Haskell's formula on the first and 16th day of each month (Piper et al. 1982). Current feeding levels are calculated using a Hatchery Constant (HC) of 6.0 in vats and 7.8 in the small raceways while fish are in 53°F spring water. Fish reared in Loving Creek exhibit extremely variable growth (dependent on water temperature) and have feed levels calculated with HC of 3.75 to 16.5. Feed rations are weighed out for individual vats and raceways each morning and hand fed eight and four times per day, respectively. Large raceways and the lagoon are fed twice daily with a blower feeder. Feed ration varied for each raceway and is based on fish size, desired growth and total weight.

FISH PRODUCTION

The Hayspur Fish Hatchery is both a production and broodstock facility for the rearing of Hayspur stock (R9) rainbow trout. All fish reared were from eggs taken locally. On October 1, 1985, there were 289,802 (40,246 lbs.) subcatchable rainbow trout (7.2 fish/lbs.) held for rearing and release in 1986. From October 1, 1985 to September 30, 1986, transfers to other stations totaled 45,423 (12,600 lbs.) R9 rainbow trout (Table 1). During the same period, 1,003,947 (75,844.2 lbs.) R9 rainbow trout were stocked to state waters (Table 2). Additionally, 40,176 (15,573 lbs.) R4 rainbow trout were received from American Falls Hatchery and then stocked by Hayspur personnel (Table 2). On September 30, 1986, there were 382,891 (42,882 lbs.) R9 rainbow trout held for rearing and release in 1987. During spawntaking in 1985, 1,478,003 eyed eggs were collected with an 83.01% eye-up. The total trout production (from October 1, 1985 to September 30, 1986) was 91,080.2 lbs., with 1,044,123 rainbow trout stocked or transferred.

FISH HEALTH

Fish health was excellent during 1986. Poor water quality has resulted in some minor losses, with symptoms of coldwater disease in winter and gas bubble disease in the spring.

The appearance of coldwater disease symptoms in late December and January was expected from prior experience (Thorpe 1985). Fish were sampled, the presence of a Gyrodactylus elegans infestation verified, and treatment with a formalin flush at 1:4,000 was initiated in all raceways. The number of parasites per fish was reduced dramatically and the losses to coldwater disease disappeared.

During May of 1986, gas bubble disease was observed in one small raceway and one vat. The small raceway occurrence followed a fish cultural error when improper damboard installation allowed water to cover the bottom of the packed column, and several hundred fingerlings were lost to gas bubble disease. Generally, the packed columns on the small raceways were very effective in preventing gas bubble disease that had been a historical problem (Thorpe 1985). In vat rearing, the 22-inch packed columns were less efficient and N₂ supersaturation was between 105% and 115% after treatment.

Table 1. Fish transfers from Hayspur Hatchery, October 1, 1985 to September 30, 1986.

Date	Species	Receiving station	Number	Pounds	Size (fish/lb.)
5-19-86	R9	Mullan Hatchery	22,680	6,300	3.6
6-16-86	R9	Mullan Hatchery	22,743	6,300	3.61
Total			45,423	12,600	

Table 2. Fingerling, catchable and adult fish stocked from the Hayspur Hatchery, October 1, 1985 to September 30, 1986.

Species	Size	Number	Pounds
R9	3-6 inch	792,365	8,209.2
R9	6 inch plus	211,500	67,225.0
R9	adult fish	82	410.0
R4	6 inch plus	40,176	15,573.0
Total		1,044,123	91,417.2

On several occasions, bacterial gill disease was found in fish reared in Loving Creek. This was invariably preceded by an increase in the silt load in Loving Creek and was successfully treated with CuSO_4 flushes.

The broodstock was sampled for disease certification in November 1985 with negative results.

FISH TRANSFERS AND RELEASES

During 1986, 45,423 catchable size R9 rainbow trout were transferred to Mullan Hatchery for redistribution (Table 1). American Falls Hatchery transferred 40,176 catchable size R4 rainbow trout to complete the Hayspur stocking obligations. Fish stocking was in regions 4 and 6 in areas noted on Figure 1. A total of 1,044,123 rainbow trout were stocked from the Hayspur Hatchery (Table 2).

SPAWNTAKING OPERATIONS

During 1985, 646 female rainbow trout were spawned and yielded 1,780,470 green eggs (2,756 eggs/female). The number of eggs per female was down from a 1984 average of 3,866 per female. Average size of the 1985 eggs was also down, averaging 285/oz. opposed to 224/oz. in 1984. Eye-up was 83.01%.

Broodstock are kept in a 150 ft. x 400 ft. dirt pond fed by spring water from several undeveloped springs and outflow from the small raceways and vats. During 1986, all supplemental spring water from the developed spring was shut off as piping was altered to feed the large raceways. Throughout the July to September period when no spring water was piped into the pond, we continued to measure 2.0 to 2.5 cfs flow out of the broodstock pond; and water temperature did not exceed 54°F at the surface.

Spawning adults are attracted into Raceway 7 with spring water from the hatchery building (Fig. 3). Installation of a ladder and finger weir in mid-September created a functional trap for collecting adults. There is presently no way of ensuring that all ripe fish are spawned, only those that chose to run up into Raceway 7. Commencing in early October, adult fish are sorted and the ripe fish are spawned once a week into early January or until the run ends.

Adult fish are anesthetized using Quinaldine prior to handling, to check for ripeness or spawning. Each ripe female is stripped into a plastic colander to drain off ovarian fluid (colanders are disinfected between fish), then eggs from three females are pooled in a pan for fertilization. No less than five males are stripped into a separate pan to mix the sperm prior to adding the eggs. A small amount of spring water is added to the eggs, and then the pooled sperm is added for fertilization. The mixture is gently stirred and allowed to set one minute. The fertilized eggs are then placed in a solution of 1:100 argentyne to water harden for one hour. Based on data collection in 1985 (Thorpe 1985), this iodophor solution causes no reduction in survival rate and is an accepted viricidal agent.

After water hardening, the eggs are measured using the Von Bayer method and placed in Heath incubators.

FISH FEED UTILIZED

Feed utilized in production was 163,750 lbs. at a cost of \$27,403.44. Broodstock were fed 8,250 lbs. at a cost of \$1,721.32. Total feed cost at the Hayspur Hatchery was \$29,123.76.

SPECIAL STUDIES

During October and November of 1985, an informal feed comparison was held for a period of 57 days. Past experiences had suggested that a variance in quality existed between Clear Springs (Buhl, Idaho) and Rangens (Buhl, Idaho) trout feeds supplied to the IDFG under contract. Two raceways of Hayspur rainbow trout from the same lot were reared under typical production conditions and fed pellets of the same size in the same manner throughout the test period.

After 57 days on feed, test fish showed no significant difference in growth, survival, feed conversion, or fish condition (Table 3). With equal cost per pound of feed, costs of rearing a quantity of fish on either feed should be identical. During the period of this study, we found that five adjacent raceways receiving Rangens feed could be cleaned-in the time required to clean one raceway receiving Clear Springs Feed. With the cost of labor involved in cleaning with a "dirty" feed, any savings in purchase cost could be quickly consumed. This facet of feed quality should be carefully considered when selecting a contract feed.

Table 3. Growth and feed conversion during the test period.

Feed brand	Number		Total length (in.)		Δ L ins. gain/day	Pounds in lot		Weight gained	Pounds feed fed	Feed conversion
	start	finish	start	finish		start	finish			
Clear Springs	40,091	40,073	7.16	7.96	.0140	6,466	9,474	3,008	4,760	1.58
Rangen's	40,088	40,073	6.88	7.76	.0154	5,345	8,275	2,930	4,600	1.57

HATCHERY IMPROVEMENTS

The IDFG Engineering crew completed a much needed piping alteration, and the crew installed a pump on one artesian well during July 1986. With this work, complete spring water can now be directly piped into the large raceways for tempering of high temperature Loving Creek water, rather than being lost to the broodstock pond. The addition of pumping to the artesian well has added another cfs of water to the headrace. Both of these new water lines have been coupled to packed column degassers for removal of N₂ supersaturation and increasing dissolved oxygen.

Hatchery personnel constructed a 12 ft. x 15 ft. spawning house over Raceway 7. The new house is sufficiently large to keep all spawning activities under protective cover and allows room for observers to actually see the spawning operation. By constructing the house of translucent corrugated fiberglass roofing, we have received some passive solar heating.

The Hayspur Campground received special attention this year with installation of new toilets, new picnic tables, new signs and a new look as we mowed grass and pruned trees to improve our public image.

MISCELLANEOUS ACTIVITIES

Visitor traffic remained high with over 8,000 visitors through the year. The campground attracted an average of 15 groups per week. The opening of Gaver Lagoon to public fishing was not as popular in 1986 as it had been in 1985 when it coincided with Free Fishing Day.

The Wood River Retriever Club held field trials here in July. The trials went well and served to improve our image and relations with local groups.

We gave presentations on hatchery operations and the life history of rainbow trout to students at Wood River High School and Junior High in April, Carey High School in May and several grade school sections in April and May.

The Hayspur brood pond was the source for six otters trapped by the Bureau of Wildlife and Region 4 personnel in July 1986.

HATCHERY NEEDS

1. Hydrological survey of available water sources for hatchery expansion.
2. Reconstruction of deteriorated concrete rearing ponds.
3. Construction of additional fingerling rearing raceways.
4. Construction of concrete holding ponds for broodstock.
5. Additional incubation facilities.
6. Fill and grade Gaver Lagoon so that fish may be removed efficiently.
7. The entry roadway needs major repair.
8. Vehicle storage is needed at both Superintendent I and Fish Culturist houses.

ACKNOWLEDGMENTS

Hatchery staff during the year included: John R. Thorpe, Fish Hatchery Superintendent II; John T. Siple, Fish Hatchery Superintendent I; Richard D. Alsager, Fish Culturist; Jeff Stanger, Laborer; Troy Peterson, Laborer; Todd G. Vierra, Laborer; and Larry L. Kimball, SYETP.

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Submitted by:

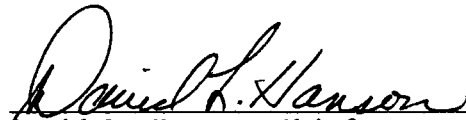
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